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SPECIFICATION
TITLE

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BROADBAND COMMUNICATION SYSTEMa **BACKGROUND OF THE INVENTION**

The invention is directed to a broadband communication system with a plurality of cordless communication devices (1) connected to one another for cordless communication with at least one communication terminal device within a communication cell.

Demanding communication services such as the transmission of video data, for example for television transmission, video playback or picture telephony, requires [sic] high data rates on the order of magnitude of 10 megabits per second. The bandwidths currently employed in cordless telephones (DECT) or, respectively, in mobile radio telephony (for example, according to GSM standard) at carrier frequencies of approximately 900 MHz through approximately 2000 MHz are therefore no longer adequate for a cordless data transmission over short distances, for example in the house and garden area or in office buildings or the like. On the contrary, higher frequencies are needed, for example above 10 GHz.

15 The informational brochure "Innovationskolleg Kommunikationssysteme" of the Institute for Communications Technology of the Technical University Dresden proposes that radio frequencies in the region of 60 GHz be employed for cordless digital broadband data transmission within buildings. However, it is generally not possible to penetrate masonry at these high frequencies. A respective radio base station must therefore be installed in every room in which a cordless communication is to be possible.

20 The informational brochure "Multimediakommunikation auf integrierten Netzen und Terminals" of the Technical University Braunschweig, Institute for Communications Technology, dated 14 August 1997, proposes that the power supply network be utilized for the data transmission within buildings.

25 GB-A-2 229 022 discloses a system wherein electrical devices connected to a power lead via data terminal devices can be remotely controlled by control data packets via a control unit likewise connected to the power lead or an infrared remote control, whereby the control data packets can comprise a size of up to 43 bytes given a maximum transmission rate of 9600 bits/s. ^{For that purpose} To that end, the data terminal devices

a are ^{designed} ~~fashioned~~ such that they can receive the control data packages either from the control unit via the power mains or via electromagnetic waves (infrared) via the infrared remote control.

SUMMARY OF THE INVENTION

a 5 An object of the present invention is to enable a cordless broadband communication within buildings and in the environment of buildings with optimally low installation outlay.

a This object is achieved by the broadband communication system disclosed
a in claim 1 comprising a plurality of cordless communication devices connected to one

another for cordless communication with at least one communication terminal

- α equipment ^{unit} within a communication cell, whereby the cordless communication devices
- α are connectible to the power supply network and are ^{designed} ~~fashioned~~ for broadband data
- α transmission via the power supply network. ~~Developments and advantageous~~

5α improvements of the inventive communication system are described in the subclaims.

Since power supply lines are usually present in every building, the invention thus allows a cordless broadband communication given the lowest possible

- α installation ^{expense} ~~outlay~~.

The cordless communication between the cordless communication devices
10 and communication terminals can be implemented via radio, preferably at frequencies above 10 GHz.

Alternatively, the cordless data transmission between communication device or base station and respective terminal device can be implemented by infrared radiation. As a result thereof, the negative influence on electrical component parts
15 present in the communication cell due to radio waves, which becomes greater with increasing frequency, is avoided. Due to its high intrinsic frequency, the infrared radiation enables a very broadband data transmission with up to several 100 megabits per second, 10 Mbit/s being thus unproblematically possible.

α The data transmission can ^{occur} ~~ensue~~ with amplitude modulation via the
20 infrared base band or by higher-grade, digital modulation methods (OFDM, CDMA).

Infrared radiation in the wavelength range from 800 nm through 1000 nm can be employed for the data transmission, this being capable of being cost-beneficially produced by laser diodes or light-emitting diodes (LED). This frequency range, however, lies close to the visible range, so that certain intensity limits dare not
25 be exceeded for protecting the eyes.

Another possibility is, for example, the wavelength range from 1200 nm through 1400 nm wherein the sensitivity of the eye is extremely low. Economical infrared sources in this frequency range are at their development stage.

In particular, the infrared source can be a vertical cavity surface-emitting
α 30 laser. Semiconductor ^{an} infrared detectors are suitable as infrared receiver, these working in the frequency range of the respective infrared source.

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a The communication system can comprise a control ^{unit 5} means (5) for controlling the communication between the individual communication devices or base stations. ¹ The control unit ¹ means can also serve the purpose of producing a connection to an external communication network, for example the telephone network or a broadband TV cable network with coaxial cable, optical fiber cable or via a radio connection as well, what is referred to as a wireless local loop.

A communication cell can be formed by a room in a building such as a residence, an office building or a factory, or can be formed by a garden or courtyard area in the environment of the building. The installed power supply network, for example a 230 volt network or a 110 volt network, ^{can} be co-utilized for the data transmission between the cordless communication devices or base stations with one another.

Preferably, the cordless communication devices can be screwed into an incandescent bulb socket, as a result whereof the installation ^{expense} outlay is further reduced. In order to nonetheless create the possibility of room illumination at the location where the cordless communication device is arranged, the cordless communication device can preferably comprise an additional socket.

The invention is explained below on the basis of a preferred exemplary embodiment with reference to the drawing, wherein the sole Figure 1 shows an exemplary embodiment of the inventive broadband communication system.

By way of example, Figure 1 shows the application of the present invention to communication within a residential building. However, let it be pointed out that the invention is definitely not limited to such applications. Of course, the communication cells can be rooms within an office building or can also be positioned out of doors. It is important that a communication between the cordless communication device 1 and the communication terminal 2 is directly or indirectly possible, for example by reflection at walls, in every communication cell.

The cordless communication devices are schematically shown in the drawing and are referenced 1. This can ^{therefore} thereby be a matter of a radio transmitter/receiver that works at a frequency above 10 GHz, for example at 60 GHz. Preferably, the cordless communication device or the base station 1 can be a matter of

an infrared transmitter/receiver. The base stations 1 are arranged at the ceiling in the drawing, whereby some other arrangement is just as easily possible dependent on the shape of the room and the furnishings. For example, communication terminal devices 2 such as a television set or, respectively, a separate TV picture screen, a cordless 5 telephone or a cordless picture telephone, a lap top computer or a surveillance camera 2 are shown. The communication terminal devices 2 are respectively equipped with a communication interface that enables a transmission to the respective base station 1
 a via radio or via infrared.^{radiation} When, for example, the user moves with his mobile 10 telephone 2 from one room into a neighboring room or when he goes out into the garden, then an automatic handover between the individual communication cells occurs.

The individual cordless communication devices 1 respectively comprise a mains plug via which the electrical power required for the operation is supplied and

a via which the broadband data transmission also ^{occurs} ensues. As a result thereof, the a 15 installation ^{expense} ^{outlay} required for installing the ^{of the invention} inventive communication system is reduced to "plugging" the base station 1 into the mains outlet.

a Additionally, a control ^{unit} ^{means} of a head station 5 is provided that, as bus controller, distributes the data to the individual base stations 1 and also the handover. a The control ^{unit} ^{means} 5 also produces the connection to external communication 20 networks such as the telephone network or a broadband TV cable network. This a connection between control ^{unit} ^{the} ^{means} 5 and external network can ^{occur} ensue via cable (coaxial cable, optical fiber cable, or what is referred to as "twisted pair" cable) or can a also ^{occur} ensue via radio via what is referred to as a wireless local loop. In the latter instance, for example, an external directional antenna (not shown) can be arranged on 25 the roof of the building.

a The base station 1 can be ^{designed} fashioned such that it can be screwed into a standard incandescent bulb socket. It is thus possible to install the base station at the a ceiling of the room at lamp sockets where a beneficial radio or, respectively, infrared a illumination of the communication cell or, respectively, of the room is possible. In a 30 particular embodiment, the base station can comprise an additional standard incandescent bulb socket, so that the base station can, for example, be screwed into

the ceiling incandescent bulb socket, whereby an incandescent lamp can in turn be attached to the base station.

a The inventive broadband communication system enables a broadband cordless communication within buildings or in the environment of buildings, whereby
a 5 the installation ^{expense} ~~outlay~~ is minimized.

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